**WHAT IS CLAIMED IS:**

1. A wireless enhancer comprising

a first antenna for receiving an incoming signal;

a receiver sub-system that amplifies and converts the incoming signal from the first antenna to a first predetermined frequency band;

a demodulator coupled to the receiver sub-system for demodulating the converted signal, and detecting timing information thereof;

a transmitter sub-system operable with the receiver sub-system that converts the signal from the receiver sub-system to a second predetermined frequency band and amplifies the signal;

a second antenna for further transmitting the amplified signal from the transmitted sub-system; and

a switch matrix that controls connection switching among the first antenna, the second antenna, the transmitter sub-system, and the receiver sub-system,

wherein the connection switching of the switch matrix is made based on the timing information detected by the demodulator and based on whether the incoming signal comes from a terminal or a base transceiver station (BTS) of a wireless communication network.

2. The enhancer of claim 1 the first antenna further comprises a directional antenna pointing to at least one component of the receiver sub-system.

3. The enhancer of claim 1 further comprising a radio frequency (RF) filter operable with the first antenna and having its bandwidth narrower than the operating bandwidth of the receiver sub-system.

4. The enhancer of claim 1 wherein the second antenna further comprises an omni-directional antenna.

5. The enhancer of claim 1 wherein the first antenna and the second antenna are placed in such a way to have their respective null points along a predetermined direction so as to maintain the maximum radio frequency isolation.

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6. The enhancer of claim 5 wherein the first antenna is a patch antenna arranged to face the BTS.

7. The enhancer of claim 6 wherein the second antenna is a dipole antenna arranged to lie on the same plane as the patch antenna.

8. The enhancer of claim 1 further comprising a radio frequency (RF) filter operable with the second antenna and having its bandwidth narrower than the operating bandwidth of the transmitter sub-system.

9. The enhancer of claim 1 wherein the first antenna and second antenna each operating with a radio frequency (RF) filter, the two RF filters having non-overlapping pass bands for improving isolation between the transmitter sub-system and receiver sub-system.

10. The enhancer of claim 1 wherein the switch matrix is a transfer switch with four ports, the first port being connectable to the receiver sub-system, the second port being connectable to the transmitter sub-system, the third port being connectable to the first antenna, the fourth port being connectable to the second antenna.

11. The enhancer of claim 1 wherein the switch matrix further includes four independent single throw double port switches and are controlled to perform two switching functions, the first of which connecting the receiver sub-system and the first antenna and connecting the transmitter sub-system and the second antenna while keeping the receiver sub-system unconnected from the second antenna and the transmitter sub-system unconnected from the first antenna, the second of which connecting the transmitter sub-system and the first antenna and connecting the receiver sub-system and the second antenna while keeping the transmitter sub-system and the second antenna unconnected, and the receiver sub-system and the first antenna unconnected.

12. The enhancer of claim 1 wherein the switch matrix further comprises four controlled amplifiers, each placed between two double port switches to attenuate signal leakage from the double port switches.

13. The switch matrix of claim 12 wherein at least one of the controlled amplifiers is replaceable by a double pole single throw switch.

14. The enhancer of claim 1 wherein the first predetermined frequency band is an intermediate frequency band lower than the signal received from the donor antenna.

15. The enhancer of claim 1 wherein the receiver sub-system comprises a radio frequency (RF) filter, a low noise amplifier, and a down converter, a band pass filter, and an adjustable gain amplifier.

16. The enhancer of claim 15 wherein the adjustable gain amplifier adjusts the gain to a level such that the signal level at the input of the demodulator falls into an operating range of the demodulator and an analog-to-digital converter connected therewith.

17. The enhancer of claim 1 wherein the demodulator is operable with a digital base band module to generate switch timing information.

18. The enhancer of claim 1 wherein the transmitter sub-system further comprises an adjustable gain amplifier, an up-converter that converts signals of the second predetermined frequency into a radio transmission frequency, and a power amplifier.

19. The enhancer of claim 18 wherein the adjustable gain amplifier adjusts its gain based on the signal level at the input of the demodulator, radio frequency leakage between the transmitter sub-system and receiver sub-system, and the maximum power output of the transmitter sub-system.

20. The enhancer of claim 19 wherein the adjustable gain amplifiers adjusts its gain based on the signal from the receiver sub-system, an operating ranges of the demodulator and an analog-to-digital converter connected therewith, a radio frequency leakage between the transmitter sub-system and receiver sub-system, and the maximum power output of the transmitter sub-system.

21. The enhancer of claim 1 further comprising a synthesizer that generates one or more local frequencies for the transmitter sub-system and receiver sub-system for their signal conversions.

22. The enhancer of claim 21 wherein the synthesizer further comprises a four port switch matrix with four switchable amplifiers to isolate each generated local frequency.

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23. The enhancer of claim 1 wherein the switch matrix is further enhanced by at least one low noise amplifier connected between the first and second antennas for reducing signal coupling therebetween.

24. The enhancer of claim 1 wherein the switch matrix is further enhanced by at least one controllable switch connected between the first and second antennas for reducing signal coupling therebetween.

25. The enhancer of claim 1 wherein the switch matrix is further enhanced by at least one controllable low noise amplifier connected between the first and second antennas for reducing signal coupling therebetween.

26. A method for enhancing a wireless radio signal between a wireless terminal and a base transceiver station (BTS) comprising:

receiving an incoming signal from a first antenna;

connecting the first antenna to a receiver sub-system;

amplifying and converting, by the receiver sub-system, the incoming signal from the first antenna to a first predetermined frequency band;

demodulating the converted signal, and detecting timing information thereof;

converting, by a transmitter sub-system operable with the receiver sub-system, the signal from the receiver sub-system to a second predetermined frequency band and further amplifying the signal;

connecting the transmitter sub-system to a second antenna; and

transmitting through the second antenna the amplified signal from the transmitted sub-system,

wherein a switch matrix is used to control connection switching among the first antenna, the second antenna, the transmitter sub-system, and the receiver sub-system and wherein the connections are made based on the timing information detected by the demodulator and based on whether the incoming signal comes from the terminal or the BTS.

27. The method of claim 26 wherein the first antenna is for receiving signals from the BTS and transmitting signals to the terminal and the second antenna is for receiving signals from the terminal and transmitting signals to the BTS.

28. The method of claim 26 further comprising generating a switch control signal based on the signal received and processed by the receiver sub-system and the detected timing information.

29. The method of claim 28 wherein generating the control signal further comprises:

synchronizing to the incoming signal received at the receiver sub-system to align a demodulation timing thereof;

demodulating the signal from the receiver sub-system;

determining a ratio of reverse link and forward link communication from the demodulated signal,

generating a switching timing signal that properly indicates switching needs between an reverse link and forward link communications based on a Time Divisional Duplex technology.

30. The method of claim 26 further comprising:

scanning a predetermined frequency band of an operating spectrum of the receiver sub-system to determine a carrier frequency band of the incoming signal; and

adjusting a first carrier frequency for the first antenna based on the determined carrier frequency and at least one additional predetermined criterion.

31. The method of claim 30 wherein the predetermined criterion includes a threshold measurement indicating the strength of the demodulated signal.

32. The method of claim 30 wherein the predetermined criterion further includes a threshold measurement indicating a signal-to-noise ratio of the demodulated signal.

33. The method of claim 30 wherein the predetermined criterion further includes a threshold measurement indicating the least traffic loading in the determined carrier frequency.

34. The method of claim 30 further comprising repeating the steps of determining and adjusting if the at least one additional predetermined criterion is not satisfied while using the first carrier frequency.

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35. The method of claim 26 wherein transmitting further comprises:

sweeping a predetermined carrier frequency band of the operating spectrum of the transmitter sub-system to determining a second carrier frequency based on the noise level of the predetermined carrier frequency band; **and**

adjusting the carrier frequency of the second antenna to be the determined second frequency.

36. The method of claim 35 wherein sweeping further comprises determining the second carrier frequency based on its separation from the first carrier frequency.

37. A wireless time division duplex (TDD) enhancer comprising:

a directional donor antenna that communicates with a base transceiver station (BTS) at a first carrier frequency;

a service antenna that communicates with a plurality of terminals at a second carrier frequency;

a receiver sub-system that comprises a low-noise amplifier, a down-converter, and an intermediate frequency filter, an intermediate frequency amplifier;

a demodulator coupled to the output of the receiver sub-system determines reverse link and forward link time slots based on a forward link signal sent from the base transceiver station;

a transmitter sub-system coupled to the output of the receiver sub-system comprises an adjustable gain amplifier, an up-converter, and a power amplifier;

a synthesizer that generates at least two local frequencies for use by the receiver sub-system and the transmitter sub-system; and

a switch matrix selectively coupling the donor antenna, the service antenna, the transmitter sub-system, and the receiver sub-system,

wherein during the forward link time slots, the switch matrix connects the donor antenna to the receiver sub-system to receive incoming signals at the first carrier frequency and connects the service antenna to the transmitter sub-system to transmit outgoing signals at the second carrier frequency; and

wherein during the reverse link time slot, the switch matrix connects the service antenna to the receiver sub-system and the donor antenna to the transmitter sub-system for receiving incoming at the second frequency and transmitting outgoing signals at the first frequency respectively.

38. The TDD enhancer of claim 37 further comprising a donor radio frequency band pass filter coupled between the donor antenna and the switch matrix.

39. The TDD enhancer of claim 37 further comprising a service radio frequency band pass filter coupled between the service antenna and the switch matrix, wherein the donor and service radio frequency band pass filters do not have an overlapping pass-band.

40. The wireless TDD enhancer of claim 37 further comprising means for selecting the first carrier frequency during the forward link time slots.

41. The wireless TDD enhancer of claim 40 further comprising means for:

connecting the donor antenna to the receiver sub-system;

disabling the transmitter sub-system;

scanning the operating spectrum of the BTS to receive a forward link signal from the BTS;

demodulating and detecting the forward link signal; and

selecting the first carrier frequency for the donor antenna to further receive the forward link signals from the BTS.

42. The wireless TDD enhancer of claim 41 wherein means for selecting the first carrier frequency further comprises selecting the first carrier frequency with the maximum broadcast signal strength.

43. The wireless TDD enhancer of claim 41 wherein means for selecting the first carrier frequency further comprises selecting the first carrier frequency with the best signal quality.

44. The wireless TDD enhancer of claim 37 further comprising means for selecting the second carrier frequency during the reverse link time.

45. The wireless TDD enhancer of claim 44 wherein the means for selecting further comprises means for:

connecting the service antenna to the receiver sub-system;

disabling the transmitter sub-system; and

sweeping the operating spectrum of the terminal to select the second carrier frequency based on the noise level thereof during the reverse link time.

46. The TDD enhancer of claim 37 wherein the synthesizer further comprises a four port switch matrix with four switchable amplifiers to isolate each generated local frequency.

47. The TDD enhancer of claim 37 wherein the switch matrix is further enhanced by at least one low noise amplifier connected between the donor and service antennas for reducing signal coupling therebetween.

48. The TDD enhancer of claim 37 wherein the switch matrix is further enhanced by at least one controllable switch connected between the donor and service antennas for reducing signal coupling therebetween.

49. The TDD enhancer of claim 37 wherein the switch matrix is further enhanced by at least one controllable low noise amplifier connected between the donor and service antennas for reducing signal coupling therebetween.

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